

## CLAIMS

1. A tunable electromagnetic signal filter comprising:
  - a dielectric constant adjustment signal generator for generating a dielectric constant adjustment signal;
  - a first element having a capacitance;
  - a second element having an inductance;
  - the first and second elements configured as an electromagnetic signal filter having a resonant frequency;
  - a ferro-electric material positioned proximate the first element for adjusting, responsive to the dielectric constant adjustment signal, the capacitance of the first element for adjusting the resonant frequency;
  - wherein a quality factor of the first element, when operated in a temperature range between about -50 degrees Celsius and 100 degrees Celsius, is greater than about 80.
2. The filter of claim 1, wherein the quality factor is greater than about 180.
3. The filter of claim 1, wherein the quality factor is greater than about 350.
4. A tunable electromagnetic signal filter comprising:
  - a dielectric constant adjustment signal generator for generating a dielectric constant adjustment signal;

an element having a capacitance and a quality factor;

a volumetric resonator;

the element and the resonator configured as an electromagnetic  
signal filter having a resonant frequency;

a ferro-electric material positioned proximate the first element for  
adjusting, responsive to the dielectric constant adjustment signal, the capacitance  
of the first element for adjusting the resonant frequency.

5. The filter of claim 1 or 4, wherein the quality factor, when operated in a  
temperature range between about -50 degrees Celsius and 100 degrees Celsius, is  
greater than about 80 for a capacitance in a range between about 0.3 pF and 3.0  
pF.

6. The filter of claim 5, wherein the quality factor, when operated in a  
temperature range between about -50 degrees Celsius and 100 degrees Celsius, is  
greater than about 80 for a capacitance in a range between about 0.5 pF and 1.0  
pF.

7. The filter of claim 1 or 4 wherein the quality factor, when operated in a  
temperature range between about -50 degrees Celsius and 100 degrees Celsius, is  
greater than about 180 for a capacitance in a range between about 0.3 pF and 3.0  
pF.

8. The filter of claim 7 wherein the quality factor, when operated in a temperature range between about -50 degrees Celsius and 100 degrees Celsius, is greater than about 180 for a capacitance in a range between about 0.5 pF and 1.0 pF.
9. The filter of claim 1 or 4, wherein the resonator comprises a stripline resonator.
10. The filter of claim 1 or 4, wherein the resonator comprises a monoblock resonator.
11. The filter of claim 4, wherein a quality factor, when operated in a temperature range between about -50 degrees Celsius and 100 degrees Celsius, is greater than about 80.
12. The filter of claim 4, wherein a quality factor, when operated in a temperature range between about -50 degrees Celsius and 100 degrees Celsius, is greater than about 180.
13. A method of designing a tunable ferro-electric filter, the tunable ferro-electric filter constructed to operate in a tunable frequency range, comprising: